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**Eglash, Ron; Krishnamoorthy, Mukkai; Sanchez, Jason; Woodbridge, Andrew**  
**Fractal simulations of African design in pre-college computing education.**

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Summary: This article describes the use of fractal simulations of African design in a high school computing class. Fractal patterns – repetitions of shape at multiple scales – are a common feature in many aspects of African design. In African architecture we often see circular houses grouped in circular complexes, or rectangular houses in rectangular complexes. Typically the accompanying ceremonies, cosmologies, and other traditions make use of scaling and recursion in their conceptual models. African scaling designs include textiles, sculpture, adornment, and other forms; in many cases there are explicit geometric algorithms and other formal aspects (e.g., pseudorandom number generation in divination systems) embedded in the associated indigenous knowledge system. Thus African fractals provide a strong counter to stereotypes of African culture as primitive or simplistic. Following this fieldwork, we developed a web site which uses Java simulations of these African designs to teach computational perspectives on fractals to high school students. We hypothesized that this combination of anti-primitivist “ethnocomputing” and design-based creative learning would enhance both the engagement and performance of under-represented students in computing. A quasi-experimental study used two 10th grade computing classes, both taught by the same instructor, and both including more than 50 %; under-represented students (Latino and African American). The control class received six days of instruction using a popular web site (with Java applets but no cultural content or design activities) for high school fractal lessons; the experimental class received the same amount of instruction using our web site. Pre/post differences on both achievement and attitude tests indicate statistically significant improvement for the students in the experimental class. Potential implications for improving participation and achievement of under-represented students in computing education are discussed.

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